

REMARKS

The present application includes claims 1-21. Claims 1-21 were rejected by the Examiner. By this Response, independent claims 1, 7, 17 and 19 have been amended.

Claims 1-21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Rand (U.S. Patent No. 5,386,445), in view of Findeisen (U.S. Patent No. 3,586,901), and in further view of Matsui et al. (U.S. Patent No. 5,442,183).

As discussed briefly with the Examiner in a telephone call on November 4, 2004, independent claims 1, 7, 17 and 19 have been amended. Independent claims 1 and 7 have been amended to recite the additional limitation that the grounded tube is positioned downstream from the ion trap and is centered symmetrically around an axis along which the electron beam travels and wherein a distance between the grounded tube and the ion trap prevents arcing between the grounded tube and the ion trap. Independent claims 17 and 19 have been amended to recite the additional limitation that the range of spherical aberration correction is extended in proportion to the position of the grounded tube and a radius of the grounded tube. Therefore, the Applicant respectfully submits that amended claims 1, 7, 17, and 19, as well as their dependent claims 2-6, 8-16, 18 and 20-21, respectively, should be allowable.

The Applicant turns to the Examiner's rejection of claims 1-21 under 35 U.S.C. §103(a) as being unpatentable over Rand, in view of Findeisen, and in further view of Matsui.

As described before, while both Rand and Findeisen both relate to electron beam tomography, both references have significant differences from the claimed invention which clearly distinguish the claimed invention from the prior art. For example, a grounded tube, which is explicitly recited in the independent claims of the present application, is not mentioned, implied, or inherent in Rand, Findeisen, or Matsui. Here, Rand improves upon the prior art and his work in his earlier patent to enhance spherical aberration capability in an electron beam system, which has been a problem in prior art systems due to ion trap aperture size restrictions and the high voltage potential that must be applied in prior art systems to extend spherical aberration limits. No other solution or information is found in the prior art in the many years between Rand, Findeisen and Matsui and the present application to render the claimed invention an inherent or obvious solution.

The addition of a grounded tube to reduce spherical aberration is a novel, useful, and non-obvious improvement provided by the claimed invention. The claims of the present application add to and improve upon the systems of Rand, Findeisen and Matsui to provide improved image quality and definition as well as patient safety (through a lower applied potential, for example). Thus, the Applicant respectfully submits that the pending claims of the present application should be allowable.

Rand relates to electrostatic control of positive ions generated by an electron beam in a scanning electron beam CT system (Abstract, col. 2, lines 44-46). A periodic ion clearing electrode ("PICE") is used in addition to a positive ion electrode ("PIE") to prevent positive ions from migrating upstream and interfering with electron beam focus

by changing potential to create fields that rapidly sweep away ions (Abstract, col. 4, lines 23-27 and lines 39-42). The claims of the present application recite a further improvement by inserting a grounded tube downstream from the PIE or other ion trap within the chamber housing to improve ion trap performance and reduce spherical aberration in the electron beam. On the contrary, Rand focuses on the insertion of a PICE upstream from the PIE to sweep away ions. The insertion of the grounded tube reduces the large voltage which must be applied in prior systems such as Rand to impact spherical aberration correction. Thus, the claims of the present application 1-21 are patentably distinct from the subject matter of Rand and should be allowable.

Findeisen relates to an electron gun for use in contaminated environments. Findeisen is directed to improving electron gun lifetime in a poor vacuum environment with residue and other environmental contaminant buildup (col. 1, lines 26-65). Findeisen seeks to reduce positive ion bombardment of the cathodes and carbonaceous residue buildup around electron gun apertures (col. 1, lines 56-62). Additionally, Findeisen introduces a second anode to act as a mechanical shield to reduce the arrival rate of residue-producing material at the aperture of the first anode (col. 1, lines 62-65). Thus, Findeisen does not teach or suggest any reduction in spherical aberration or improvement in PIE or other ion trap performance.

The shroud mentioned in Findeisen is used with an isolation means to allow gas into the electron gun chamber (col. 2, lines 62-75). The shroud protrudes from the electron gun to provide a substantially constant electric field for electrons to pass from isolation means into the electron gun light valve (col. 4, lines 55-59). The shroud

prevents stray electric fields built up on the exterior of the electron gun from affecting the electron beam (col. 4, lines 59-61). Thus, the shroud serves a protective purpose in Findeisen – to keep outside interference away from the electron gun.

Additionally, the “potential hill” in Findeisen, which is referenced by the Examiner, is created by a relationship between the cathode, first anode, and second anode and is not affected by the shroud (col. 5, lines 2-30). Findeisen does not discuss using the shroud in conjunction with a PIE or other ion trap to reduce spherical aberration. The shroud is present in Findeisen simply to help protect the electron gun environment from outside interference and residue.

The claimed application improves upon Findeisen and other prior art by introducing a grounded tube, as illustrated for example in Figures 2, 3, and 8, which is used to adjust the spherical aberration correction limits of an ion trap to improve spherical aberration correction. The use of the grounded tube is not inherent or implied in the prior art because the grounded tube and its positioning with respect to the ion trap are not present in the prior art, including Findeisen. In order for the Examiner to “rely[] upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.” MPEP § 2112 (citing *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1464 (B.P.A.1 1990)). The characteristics of a grounded tube and its relationship to an ion trap were not recognized or appreciated in the prior art, and the addition of a grounded tube to an electron beam system represents a novel improvement. Thus, the claimed invention results in improved image quality over Rand, Findeisen, and the other prior art. As image quality is

important in many diagnostic applications, such as medical image, an improvement in image quality is highly desirable.

Therefore, Findeisen and Rand, taken alone or in combination, neither teach or suggest, explicitly or inherently, use of a grounded tube in an electron beam to adjust electrical properties of an ion trap to extend a limit of spherical aberration correction. Thus, the Applicant respectfully submits that claims 1-21 of the present application should be allowable.

Matsui relates to an electron microscope or ion spectrometer system (col. 1, lines 10-19). Matsui focuses on keeping a charged particle source in the highest possible vacuum state (col. 1, lines 65-68 and col. 2, line 1). The Matsui patent improves on a two chamber vacuum system by making the system small and lightweight (col. 2, lines 1-68 and col. 3, lines 1-18). The final electrode of Matsui is supplied by a first lens electrode with a high voltage (at least three times as high as the final acceleration voltage of the charged particles) to reduce beam column size and weight (col. 3, lines 30-46). Matsui may include a plurality of electrodes, wherein one or more the electrodes is connected at a common high voltage potential in order to reduce beam column size (col. 15, lines 11-68 and col. 16, line 1). Thus, Matsui is concerned with maintaining a high vacuum state in a lightweight, smaller system and not with improving spherical aberration correction, particularly improved spherical aberration correction by inserting a grounded tube downstream from an ion trap.

The electrodes of Matsui are distinct from the grounded tube of the pending claims. The grounded tube, examples of which are illustrated in Figures 2 and 8 of the

present application, acts in conjunction with an electrode, such as a positive ion electrode. The insertion of the grounded tube in the claimed invention allows spherical aberration correction with lower voltages, rather than the much higher voltages used in Matsui.

Therefore, Matsui, Rand, and Findeisen, represent examples of prior art systems to which the claimed invention offers an improvement in image quality through improved spherical aberration correction at lower voltages. Thus, the Applicant respectfully requests allowance of claims 1-21.

The Applicant is unsure if the Examiner's statement that "the use of a tube that extends downstream from anode 14 in accordance with Findeisen (901) is equivalent to the use of a tube located downstream from an ion trap" is intended to constitute Official Notice on the part of the Examiner. The Applicant is also unsure if the Examiner's statement that it "would have been obvious to one having ordinary skill in the art at the time the invention was made to adjust the trap aperture size and the grounded tube radius" is intended to constitute Official Notice on the part of the Examiner.

If the Examiner is asserting Official Notice that use of a protective shroud that extends downstream from an anode and outside the electron gun housing to protect an electron gun environment from residue and exterior electric fields is equivalent to the use of a grounded tube downstream from an ion trap to improve spherical aberration correction is implied in the art and/or is common knowledge, the Applicant respectfully traverses the Examiner's assertions. If the Examiner is asserting Official Notice that adjustments to trap aperture size, grounded tube radius, and inclusion of a grounded tube are obvious and common knowledge to one of ordinary skill in the art, the Applicant

respectfully traverses the Examiner's assertions. Under MPEP § 2144.03, the Examiner is now obligated to cite references in support of the Examiner's assertions.

Alternatively, if the Examiner's assertions are based on the personal knowledge of the Examiner, then under MPEP § 2144.03(C) and 37 C.F.R. § 1.104(d)(2), the Examiner's assertions must be supported by an affidavit from the Examiner. According to MPEP § 2144.03(A), Official Notice, without supporting references, should only be asserted when the subjects asserted to be common knowledge are "capable of instant and unquestionable demonstration as being well-known." That is, the subjects asserted must be of "notorious character" under MPEP § 2144.03(A).

The Applicant respectfully submits that the subject matter of the Examiner's assertions of Official Notice are not well-known in the art as evidenced by the searched and cited prior art. The Applicant respectfully submits that the Examiner has performed "a thorough search of the prior art," as part of the Examiner's obligation in examining the present application under MPEP § 904.02. The Applicant respectfully submits that the Examiner's searched and cited references found during the Examiner's thorough and detailed search of the prior art are indicative of the knowledge commonly held in the art. However, in the Examiner's thorough and detailed search of the relevant prior art, none of the prior art taught or suggested the subject matter of the Examiner's assertions of Official Notice. That is, the Examiner's thorough and detailed search of the prior art has failed to yield any mention of the teachings that the Examiner is asserting are widely known in the art. The Applicant respectfully submits that if the subject matter of the Examiner's assertions of Official Notice had been of "notorious character" and "capable of instant and unquestionable demonstration as being well-known" under MPEP §

2144.03(A), then the subject matter would have appeared to the Examiner during the Examiner's thorough and detailed search of the prior art.

If the Examiner had found any teaching of relevant subject matter, the Examiner would have been obligated to list the references teaching the relevant subject matter and make a rejection. Consequently, the Applicant respectfully submits that the prior art does not teach the subject matter of the Examiner's assertions of Official Notice and respectfully traverses the Examiner's assertions of Official Notice.

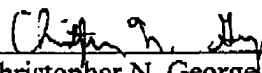
Therefore, the Applicant respectfully submits that claims 1-21 of the present application are allowable.

CONCLUSION

The Applicant thanks the Examiner for his work in reviewing the application and claims for allowance. The application is now believed to be in condition for allowance and an action to this effect is respectfully requested. If the Examiner has any questions or would like to offer an Examiner's Amendment or if the Applicant can be of any assistance, the Examiner is invited and encouraged to contact the Applicant at the number below. Please charge any additional fees or credit overpayment to the Deposit Account of GTC, Account No. 070845.

Respectfully submitted,

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